RF

VOL. LII NO. 2 P.O. Box 3454, Tustin, CA 92781-3454 February 2011

The PREZ Says:

As we ease into August and the warm days of Summer, we have a relaxing and very enjoyable time ahead of us. We can look back on this year's accomplishments so far (Portables-in-the-Park, Field Day, OC Fair Blue Ribbon OCCARO win, etc.) with a warm and proud feeling. The fun will continue into the rest of the year with our fine Presenters, the Auction and the OCARC Holiday Party, plus The ARRL SWD Convention, Hamcon 2011, in September! (See the Ham Related link on www.W6ZE.org for details). I hope you are all looking forward to future events as much as I am! Please continue having a wonderful Summer!!

73 de Paul W6GMU

"

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THE ORANGE COUNTY AMATEUR RADIO

SPECIAL SERVICE CLUB

Club Dues:

Regular Members…$20
Family Members*…$10
Teenage Members…$10
Club Badge**…$3

Dues run from Jan. through Dec. & Are prorated for new members.
* Additional members in a family of a regular member pay family rate up to $30 per family
** There is a $1 charge for the badge being mailed to you.

ORANGE COUNTY AMATEUR RADIO CLUB – W6ZE

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OCCARO Delegate:
Kristine Jacob, KC6TOD
kc6tod@w6ze.org

MONTHLY EVENTS:

General Meeting:
Third Friday of the month
at 7:00 P.M.
AMERICAN RED CROSS
601 N. Golden Circle Dr.
(Near Tustin Ave. & 4th St.)
Santa Ana, CA

Club Breakfast:
Second Saturday of the month
at 8:00 am
Jaugerhaus
2525 E. Ball Road
(Ball exit off 57 freeway)
Anaheim, CA

Club Nets (W6ZE):
7.086 ± MHz CW OCWN
Sunday 9-10 a.m.
Rick KF6UEB, Net Control

28.375 ± MHz USB
Wednesday 7:30-8:30 p.m.
Bob AF6C, Net Control

146.55 MHz Simplex FM
Wednesday 8:30-9:30 p.m.
Bob, WB6IXN, Net Control

OCARC Board Meeting Minutes for: July 9, 2011

The OCARC Board meeting was held at the JägerHaus Restaurant, 2525 East Ball Road, Anaheim, and called to order by Paul Gussow W6GMU (President) at 8:19AM Saturday, July, 9, 2011. Roll was called by Doug Britton W6FKX (Secretary), there were a total of 8 directors and 2 visitors – Dianne Konechy and John Roberts (W6JOR). There was a quorum with the directors' present.

DIRECTOR REPORTS:

- Vice President George Jacob N6VNI – absent – no report.
- Treasurer Ken Konechy W6HHC – reported on Field Day's expenses (totaling approximately $1300, under the $1,600 budget, and handed out the club's YTD cash flow through 7/07/2011. Ken also reported that the club's account totaled over $5000.
- Secretary Doug Britton W6FKX – no report this month, will be on vacation and will miss the July general meeting; needs a director to take notes.
- Activities Kristin Dankert K6PEQ – absent, no report.
- Membership Jeff Hall W6UX – absent, no report.
- Publicity open – Steve Brody resigned as publicity member. Position is open.
- Technical Bob Eckweiler AF6C – Bob reported that the club's generator worked fine for field day.
- Directors-at-large – Dan Dankert N6PEQ – absent, no report.
  Larry Mallek K6YUI –

OLD BUSINESS:

- **RF Newsletter "Rotating" Editors – thank you to all who volunteer!**
  - July – Paul W6GMU
  - August – Kristin K6PEQ
  - September – Doug W6FKX
  - October – Kris KC6TOD
  - November – Ken W6HHC
  - December – Bob AF6C (tentative)

- **Field Day Update** – Clubs 4th highest score, some bands short on operators. Brett and the Boy Scouts did a great job!

- **OCARC equipment inventory -** Ken mentioned that the club's old generator and trailer needs a new storage location.

- **Portables – in – the – park –** no report.

- **Bob AF6C's Kit-Building Class –** Bob discussed some possible kits, bandpass filter? No specific plans at this point.

- **Drive – in mobile amateur event –** Event is cancelled (unless someone wants to step up, take over from Steve and organize it?).

- **Orange County Fair – OCARC participation –** volunteers needed for mid-day time slot. Contact Kristin Dankert K6PEQ if you are interested.

NEW Business

- Steve Brody N1AB resigned from the board, thanks Steve for your help this year. Sorry to see you go. Paul W6GMU will approach individuals at the July general meeting. It was discussed that perhaps other board members could fill in, delivering club flyers etc. until the position is filled.

- Bob AF6C suggested that perhaps the club could participate during one of the weekly nets entirely on emergency power.

GOOD OF THE CLUB – It was mentioned that during Field Day, Europe was easily heard. Also the IARU DX contest was this upcoming weekend

Motion made to adjourn meeting by Paul Gussow W6GMU, seconded by Larry K6YUI and unanimously approved.
Meeting adjourned 9:00AM

Respectfully submitted:
Doug Britton W6FKX, OCARC Secretary

OCARC FIELD DAY

OCARC Field Day event are now up on the OCARC WEB site at **www.W6ZE.org**
Click on the **PHOTO GALLERY** link down the left-hand-side of the front page. The photos are all up…all of the captions are completed. There are just a few people that I do not recognize….marked with **????**. If you know them, send me an e-mail. Again MANY THANKS to the thirteen great photographers who contributed their photos this year:

Bob	AF6C
Bob	K6DNR
Clem	WØMEC
Doug	N6UX
Fried	WA6WZO
Jay	KI6WZU
John	N6OHM
Ken	W6HHC
Kris	W6KJC
Paul	W6GMU
Paul	WA6LJV
Sandi	WA6WZN
Susan	WU6U

Let me know if you have any corrections or questions,

…de Ken W6HHC - OCARC WEBmaster

Come join *W6ZE* "Portable in the Park" for the *California QSO Party*!!!

WHO: All OCARC members!

WHAT: Compete for the club in the California QSO Party!

WHERE: Jeffrey Open Space Preserve in Irvine, CA (33.703564,-117.753804)

WHEN: Saturday, October 1st, 2011 9:00 AM TO 6:00 PM

Please join us for a fun day of Ham contesting in a peaceful park setting located in North Irvine! W6ZE will be entering the **California QSO Party** as a *Multi Station-Multi-Operator Low Power Club Competition* Station.

The CQP is the **most anticipated** QSO party of the year for California Ops because it's the largest QSO party on the contesting calendar and everyone in the world wants to work us!

We'll be fielding an Elecraft K3 on **20m Phone/CW** and an Icom IC-7000 on **10m/15m Phone/CW**, with operation continuing until dark or our batteries are exhausted. For the remainder of the contest club members may compete from their home stations and submit their individual scores for the club's combined score.

Never contested before? No problem! Come and watch experienced contesters to learn how it's done and then make some contacts for the club. You'll learn how to call CQ and hold a frequency down during a contest, similar to how we do it for Field Day. Contesting is one of the most popular disciplines in the Amateur Radio hobby!

Can't make it? No problem! While we'd love to have you come out to the park, **you can compete for the club AT HOME**! Full details on how to do this are available at http://www.cqp.org/Rules.htm. The more club members that compete from home and submit scores for the club, the better our chances are at taking the top California Club Station award!

Bathrooms are close by and there is a small picnic area with several tables (please bring your own food and drinks).

Contest Captains

Jeff W6UX (w6ux@w6ze.org) is the 20m station captain and **Tim K6GEP** (timgep@yahoo.com) is the 10m/15m station captain for this event. Contact them directly if you would like to pre-register a time slot to operate at the park. You don't have to pre-register, but you may have to wait to operate if you don't. We really want to achieve a high contact rate and have good teachers on hand for new contesters, so experienced ops please come out!

Directions to the Park:

Take INTERSTATE 5 to the JEFFREY ROAD Exit in Irvine
Right on JEFFREY ROAD
Right on LONG MEADOW
Left on VINTAGE
Left on LAMPLIGHTER
Right on GRASSLAND BUNGALOW
Park between TRIPLE and SHEPARD; park is on the left.
Take one of the two short dirt trails to the picnic tables.

Visit maps.google.com and paste **33.703564,-117.753804** into the search box to get a satellite overview of the area.

BE SURE TO MARK SATURDAY OCTOBER 1, 2011 ON YOUR CALENDAR

Anacapa Island On The Air

by Jeff Hall, W6UX and Tim Goeppinger, K6GEP

Anacapa Island (IOTA NA-144), located 12 miles off the coast of Ventura, is the smallest of the Channel Islands archipelago, part of the Channel Islands National Park. It is made up of three islets: East Island, Middle Island, and West Island, with a total land area of 1.138 square miles. The highest peak, Summit Peak 2 on West Island, is 930 feet.

On the night of December 2, 1853, the side-wheel steamer *Winfield Scott* running at full speed crashed into the rocks off Middle Anacapa and sank. All hands survived and were rescued a week later, but the “island of deception” as the original Indian inhabitants had called it, lived up to its reputation as a shipping hazard. In 1912 the US Coast Guard built a light beacon, followed by a light station in 1932. The lighthouse, located on East Island, was the last one built by the US Lighthouse Service.

WLOTA-1300

Middle Island and West Island are off limits to visitors, but East Island offers hiking trails, incredible views from its 200' cliffs, and a small campground. East Island's iconic natural feature is Arch Rock, a 40-foot high natural bridge. All three islands are home to thousands of birds including Western gulls, the California Brown pelican, and numerous species of cormorants.

Arch Rock

Despite its ease of access by boat and short proximity to the mainland, NA-144 is rarely heard on the ham bands, and therefore is an excellent location for an entry-level DX-pedition! The 1 hour trip to the island is $75, and the campsites are only $20 per person. A DX-pedition for under $100!

Jeff W6UX, Tim K6GEP, and Rich AE6RS camped on Anacapa for the weekend of July 29-31, which coincided with the Islands on the Air (IOTA) contest. The IOTA Contest weekend was chosen because IOTA Island stations can generate large pileups. The NA-144 Channel Island entity is needed by about 75% of the participants in the RSGB IOTA Program, and most of those are in Europe. NA-144 had not been on the air in the contest for several years.

The major objectives for the trip were:

- Generate and work large pileups
- Learn the logistics of DX-peditioning
- Compete in the IOTA Contest (a distant 3rd)

The task once we got to Anacapa was daunting. We had to haul about 400 lbs of equipment and water up 158 stairs (200 feet) and over to the other side of the island, which was about 1/2 mile. The heaviest items were our AGM batteries, totaling almost 200 Ah in capacity. Thankfully, Rich had the good idea to bring along a

wheelchair to haul the stuff. It was pure genius because it was also used as a chair at the operating position. Being the only ones there Friday, we had our choice of camp sites. First up went our tents and then our two Spiderbeam 12m fiberglass masts with Par Endfedz vertical dipole antennas for 20 and 40 meters.

Friday night we got on the air, and were treated to our first pileups from Europe. With just 50 watts and a vertical, we knew it was hard to hear our signal under the pile, so we ran split up 1 Khz and that helped a lot. The pileup got bigger and bigger, as we were spotted on the DX clusters. At one point, the sound became a buzzing beehive, and you just had to take off your headphones and laugh. We pushed our K3 to its limits of filtering, dropping the bandwidth filter down to 50 Hz at times. "We just worked Israel!", Rich joyfully shouted. This went on for several hours, then things calmed. "How's the battery on the laptop?" "Not good, let's plug in the power adapter....hey, this is the wrong size adapter!". Oops! Despite our methodical planning and detailed checklists, somehow we brought the wrong sized adapter plug for the computer. "Looks like we're gonna have to use paper logs for the contest. Lovely!".

When you go on a DX-pedition, you can count on only one thing: something is bound to go wrong. Luckily, we had plenty of pencils, pens, paper, and preprinted log sheets for the contest. By going to a two-person system, with one logging, the other operating, and both on headphones, we managed just fine.

The IOTA contest began at 5:00am Saturday morning and the winds were beginning to pick up as a storm system was moving down along the coast. The day would see gusts hitting 50+ MPH and our tent was getting absolutely slammed by the wind so we spent quite a bit of time rigging extra guy ropes to keep the walls of the tent stable. Still, the tent, which Tim had just purchased for our trip, was beginning to rip apart from the unrelenting abuse.

Throughout the day we received visits from other campers and park ranger Doug. We educated them about what we were doing, and why ham radio is such a great thing. Doug got to watch us contact Ukraine and he thought that was neat. One of our neighbors even made us tacos for dinner!

Conditions on 20m were so-so with a bit of an elevated K-index. 15 meters was not too productive. We had some nice pileups again with great conditions Saturday night, with Jeff working a major pile up for over an hour on 20m Phone. It was great to hear Arnie N6HC break through with words of encouragement for the team! Everyone wanted our multiplier!

Towards late evening, it was apparent our 40m antenna mast was not going to survive the winds. It had to come down so we could guy it more securely. We succeeded in doing that, but something changed and the SWR went crazy. Running out of time, we decided to punt on the 40m Par so at 12:30am, with wind gusts exceeding 40 MPH, Rich and Jeff erected the Super Antennas MP-1 Portable vertical and ran 4 elevated radials to the corners of our camp site. It's a little unsettling standing on a picnic table balancing a 30' mast and getting buffeted by the winds in pitch black darkness, having only an LED headlamp for light. With 40m working again Tim and Rich were able to continue making CW contacts until the band dried up around 2:30am. It was time to call it quits, but we were very satisfied with the results.

By Sunday morning we had logged almost 500 contest contacts. We still had a little bit of battery power left, so Jeff jumped on SSB and called CQ. A few people came back, but most had gone to bed. But one booming signal came in like he was next door. A ham from South Korea came in 58 and he reciprocated a similar report for our station. Not bad for 100 watts on battery and vertical dipole. This was Jeff's first QSO into South Korea on Phone. In all, we estimate there were between 600 and 800 contacts achieved during our stay, having worked all continents except Antarctica. Not bad for a couple of newbie DX-peditioners!

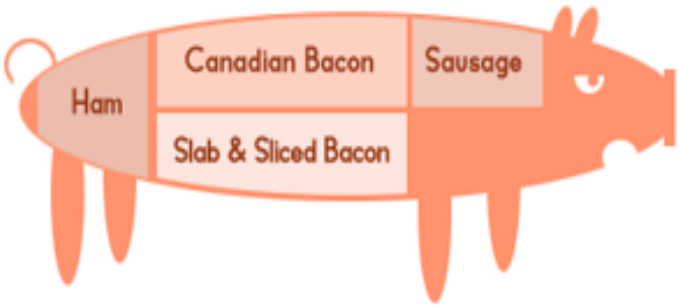
We drained our last battery by 9:00am and then promptly started packing up. It took over 6 hours to get everything back to the dock, and thanks to help from several others, we got the last pack down the stairs just as our boat pulled up.

The ride home was a little choppy, but the sun was out and it was tee shirt weather! All of us agreed this was a fantastic experience and we can't wait to go back next year. Anacapa is a great place to visit and operate from, even if you go there for just a short day trip. Transport is cheap and the location is a high value target for DXers.

NA-144 DX-pedition Team: Jeff W6UX, Rich AE6RS, Tim K6GEP

All three of us want to extend our thanks to the boat crew for allowing us to take so many heavy packs, the park staff for allowing us to erect our antennas, and Tom WA6WPG, who has operated from Anacapa on several occasions, for helping us plan the trip and loaning us several pieces of equipment.

Ham Cuisine



by Kristin, K6PEQ

Hawaiian Baked Beans

The season of BBQ is upon us! This is a great recipe for a luau, a picnic or a BBQ with friends. Let's eat!

Ingredients:

3 (16 ounce) cans great northern beans
1 cup chopped onions
1 1/2 cups dark brown sugar
1/2 lb cubed cooked ham
3/4 cup ketchup
1/2 cup crushed pineapple, drained
2 tablespoons prepared mustard
1 1/2 tablespoons cider vinegar

Cooking Directions:

1. Preheat oven to 350 degrees F.
2. Mix together all ingredients.
3. Place in a buttered 9x13-inch baking dish.
4. Cover with foil.
5. Bake at 350F for 1 1/2 hours.

Remove foil and bake for 20-30 minutes more.

Enjoy!

OCARC General Meeting Minutes
July 15th, 2011

The OCARC March General Meeting was held at the Red Cross complex in Santa Ana at 7:00 pm on Friday evening, July 15th,2011. There were a total of 46 members and visitors present. We had a quorum with the board members present. Paul W6GMU – President was absent and in his place George N6VNI – Vice President ran the meeting.

George N6VNI opened the meeting with the Pledge of Allegiance followed by the introduction of members and visitors.

George introduced our guest speaker, Brendon Geary KJ6HVP. Brendon brought his family as his own personal cheering section.

Brendon's presentation was on his experience with launching a weather balloon, including the steps he took to build his repeater for the balloon, the cameras, antennas and other objects he used to create his science project. He has launched 10 weather balloons thus far and he is not done yet.

Brendon explained his launches and successes. He was so informative and took the time to answer questions throughout his presentation. On Flight #10, here are some of the statistics – the balloon reached a speed of 204 mph with an altitude of 97,011.

Brendon's website is: www.KJ6HVP.com . To track him you can search APRS.FI – KJ6HVP-11.

There was a Field Day Review:

- 50 people
- 8 transmitters
- Additional 1000 points
- Stations ran 10 through 80 meters

Everyone participating had a great time

Kristin K6PEQ announced the Orange County Fair days for OCARC were July 20th and August 6th. She needed additional volunteers for both days.

George N6VNI, HAMCON Vendor Chair updated the group on HAMCON 2011 – the vendor room is full 38 vendors and 63 booth filled.

SHOW & TELL – Chip Margelli K7JA shared a simple unit that used with military masts making the hoisting of the masts very easy. Chip worked Field Day from Onyx Peak 9,100. He and three other hams ran 2A. He said they had a great time.

Remember if you have something for the Show and Tell bring it to the next meeting on August 19th , 2011.

Bob AF6C received a call from William Myatt WA6YKH's daughter to let the club know that he was now a silent key. He was a former member of OCARC.

GOOD of THE CLUB – nothing this month.

Just a reminder that the ORARC Board Meetings will now be held on the second Saturday of each month at 8:15 AM at the Jagerhaus Restaurant, 2525 East Ball Road Anaheim. Visitors are welcome.

Motion was made to adjourn at 8:55 pm by Larry K6YUI, seconded by Dan N6PEQ. Fun opportunity drawing was to follow.

Submitted by:
Kristine Jacob KC6TOD for Doug Britton W6FKX

Note from V.P.

Hi,

Just a little something from the V.P.

Our August 2011 meeting quest speaker will be Phillip "PHIL" Pacier AD6NH. Phil is the asst. store manager at Ham Radio Outlet, or better known as "HRO"

Phil's presentation will be on A.P.R.S. Automatic Packet Reporting System.

De George T. Jacob Jr. N6VNI

OC Fair Ham Radio Booth!

as they say in the carnival area.....

WINNER WINNER WINNER ! ! !

Our ham radio operation is a blue ribbon WINNER !

Judging took place yesterday and today , and the judges came back to hear the ol' time radios playing their familiar tunes , plus some air time on ATV , and even had a chance to talk over the airwaves and pound some brass !

" We selected YOUR booth , not as a booth , but as a live action demonstration of what ham radio is all about . " said one of the judges .

" You get everyone involved who walked by , hearing the sounds of a foreign station , dots and dashes , fun TV , and those great old fashioned radios playing that fun great music ! You show them the stuff , live , and on the air ! "

Good work , everyone , for our blue ribbon First Place award ! It was **YOU** , and not necessarily the radios , paperwork , and booth decorations , that earned YOU the First Place Blue Ribbon !

A million (1,000,000) THANKS , from a million (1,000,000) visitors , (as of last Sunday) to the OC FAIR 2011 !

The HAM RADIO BOOTH was standing tall with YOU , our organization and club volunteers , members of OCCARO !

Thanks OCCARO for stepping up to the 20 foot booth commitment !

OCARC supplied VE examiners for several ham tests on Saturday , and the exam process went smooth as silk ! Lots of CW DX on Saturday , too , on the Icom rig !

Award Winning OCARC Field Day Photo

The OCARC webmaster looked at a ton of great Field Day photos that were taken by thirteen photographers who contributed to our website FD photo gallery. A new OCARC member, John Centorbi N6OHM, took a lot of super photos at FD, but one was declared **"Best OCARC Field Day Photo"**.

The caption on the OCARC website reads: **"Two young Boy Scouts venture from the GOTA station to seek adventures in the 75M phone tent. Carl N8AE (in the background) provides coaching and encouragement for these future hams."**

The FD photo collection can be found on the OCARC WEB site at **www.W6ZE.org** Click on the **PHOTO GALLERY** link down the left-hand-side of the front page.

ARRL TAPR Digital Communication Conference

Every September TAPR (a world-wide organization of hams advancing the technology of digital ham communications) holds a Digital Communications Conference (DCC). The TAPR Digital Communications Conference is an international forum for radio amateurs to meet, publish their work, and present new ideas and techniques. This year, the ARRL-TAPR DCC will be held on Sept 16-18 in Baltimore, MD.

OCARC member Ken W6HHC and Charles Brain G4GUO (Ferring, England) have been asked by TAPR to make a presentation on Digital-ATV (D-ATV). Ken W6HHC and Charles G4GUO teamed-up to prepare a presentation called:

DATVexpress –

A Lower Cost Approach to DATV Transmitter

Rather than fly to Baltimore, Ken and Charles will be making the presentation remotely. They plan to use Skype and WebEx to narrate a PowerPoint presentation from the comfort of their homes.

More information about the ARRL TAPR 2011 DCC can be found at:

http://www.TAPR.org/conferences.html

Copies of DCC presentations from previous years can be downloaded (free) at:

http://www.TAPR.org/pub_dcc.html

Heathkit of the Month #32:
by Bob Eckweiler, AF6C

Heathkit

The Heathkit LG-1
Laboratory RF Signal Generator
(and its Early Family - Through 1956)

Introduction:
The radio frequency (RF) signal generator is a tool needed by any serious radio amateur who builds radio equipment, tinkers or services his or her own equipment. Thus Heathkit has offered over the years numerous models of RF signal generators offering improving capabilities with each new model, while keeping the cost reasonable.

This month's article will cover the early RF signal generators produced by Heathkit from the start of the company through 1956 (around the time when Daystrom bought Heathkit), focusing on the Heathkit LG-1 Laboratory RF signal generator - See Figure 1. Information is hard to obtain on some of these old units so they will be discussed only briefly. Perhaps a reader can fill in some missing details.

Model:	From:	To:
G-1	1/48	9/49
G-4	no information	
G-5	9/49	9/50
SG-6	9/50	9/52
SG-7	9/52	9/53
SG-8	9/53	(1961)
LG-1	9/53	(1962)

Table 1: Production Years

The RF signal generators produced over this period and their dates are given in table 1.

As one can deduce from the table, Heathkit, in the late forties and early fifties, often introduced their new and updated kits in time for their fall flier, and the Holiday shopping season.

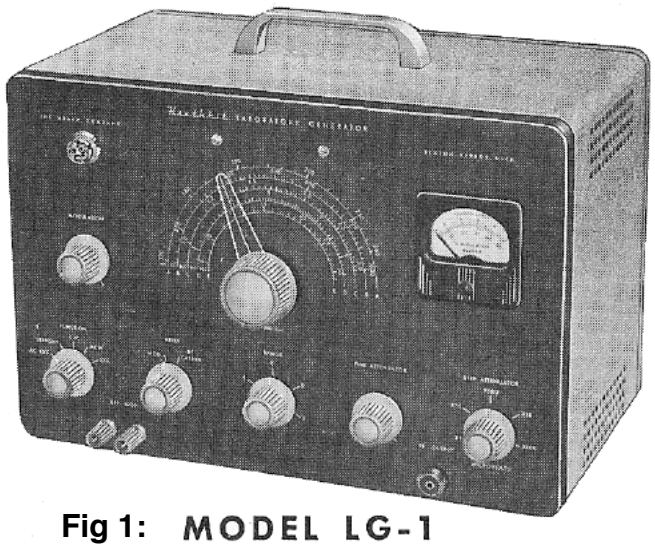


Fig 1: MODEL LG-1

Heath G-1 RF Signal Generator:
Heathkit introduced their first unit, the G-1, in early 1948 for $19.50 - See Figure 2. It covers 150 Kc to 34 Mc (See note 1) in five bands. A built in relaxation oscillator provides modulation when selected. The G-1 was modified a couple of times during its manufacturing run; these were mostly cosmetic changes including a new handle and front panel paint. The G1 uses just two tubes, a 6X5 rectifier in the power supply and a 6SN7 dual-triode. One section of the dual-triode is the RF oscillator and the other section is a 400 cps audio oscillator providing modulation; this audio is also available at the front panel. The audio oscillator uses an

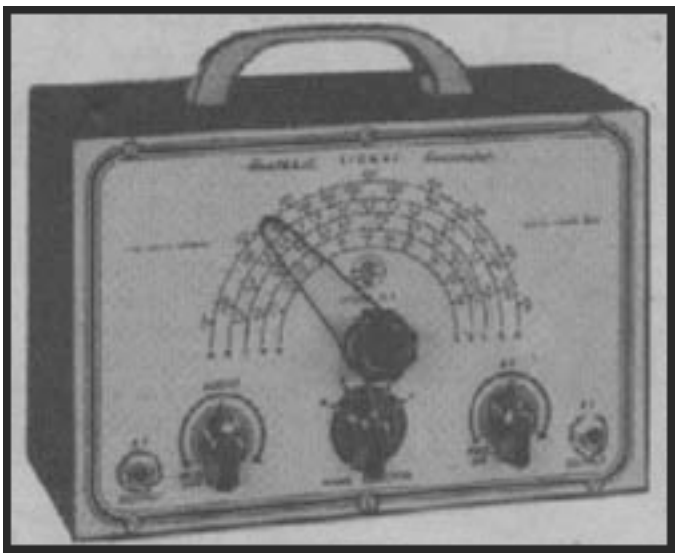


Fig 2: G-1 Signal Generator

Fig 3: Fall 1950 Ad for the New SG-6 RF Signal Generator

NE-51 neon bulb in a relaxation type circuit. Front panel controls are simple. A 5-band switch (see table-two for the frequency ranges), a tuning control with a plastic graticule over a front panel 5-band scale, an RF level control with power switch, an audio level control with modulation switch, and 1/4" phone jacks for RF and audio output. The G-1 tuning knob is direct drive so adjustment is a bit challenging.

Band	Lower:	Upper:
A	150 Kc	450 Kc
B	450 Kc	1300 Kc
C	1.3 Mc	4.0 Mc
D	4 Mc	12 Mc
E	12 Mc	34 Mc
E_3*	34 Mc	102 Mc

(* G-5 only)

Table 2: G-1 & G5 Band Ranges

Heath G-4 HF-AM Signal Generator:
Here is a mystery kit. I found some references to this kit, but no schematic or description other than the title. I even found one place selling a photo copy of the manual, which I'd buy if I actually had the unit. Heathkit made a G-2 Audio Oscillator and a G-3 Sweep Generator, so the existence of a G-4 is a given.

Heath G-5 RF Signal Generator:
Electrically, the G-5 is similar to the G-1 with just a few component refinements. It features 5:1 vernier tuning and a new scale that now includes the third harmonic of band E (36 Mc to 102 Mc). The G-5's audio circuit was altered to allow external modulation, making the audio-out phone jack also the audio-in connector. The AF IN - OUT control is marked INT. MOD. at its fully counterclockwise position and EXT. MOD. at its fully clockwise position. When turned fully CCW the switch controlling modulation type is switched to the internal position, where it remains until the control is moved fully CW where it switches to the external position. There it remains until again moved fully CCW. Thus the control acts as both audio output level, audio input level and audio in / out selector.

Heath SG-6 RF Signal Generator:
In time for the 1951 updates, Heathkit changed their nomenclature; the G line became the more distinguishable SG line. Heath entered this decade with the SG-6 signal generator (Figure 3) that still sold for the $19.50 price of the G-1. It is a completely redesigned RF signal generator.

The power supply in the SG-6 uses a selenium rectifier; gone is the 6X4 tube rectifier. It also uses two miniature seven-pin 6C4 triodes, one

for the RF oscillator and one for the audio oscillator and modulator. A jeweled green pilot lamp holding a #47 miniature bulb, missing on earlier units (and often an added modification), now adorns the front panel.

The RF oscillator, using the higher frequency 6C4 tube, covers new fundamental frequency ranges up to 50 Mc (see Table 3), and the RF output includes a 3-position step attenuator as well as a variable control. Coils come pre-calibrated to simplify final adjustment.

Band	Lower:	Upper:
A	160 Kc	510 Kc
B	500 Kc	1650 Kc
C	1.65 Mc	5.7 Mc
D	5.4 Mc	19 Mc
E	17 Mc	50 Mc
E_3*	51 Mc	150 Mc

* Calibrated 3rd Harmonic of Band E

Table 3: SG-6 & SG-7 RF Ranges

The audio section is no longer a relaxation (neon bulb) oscillator, but instead it is a Colpitts oscillator using the second 6C4 tube. This circuit produces a much cleaner 400 cps sine wave signal than the sawtooth wave of the earlier generators. Separate connectors are used for AF Out and AF In, which are selected by the Modulation switch. Table 4 shows the full complement of controls.

Heath SG-7 RF Signal Generator:

The SG-7 replaced the SG-6 in the usual September timeframe in time for 1952. It continued at the $19.50 price. The SG-7 is identical to the SG-6 except for a change in the value of the resistors in the RF oscillator's cathode circuit. Cosmetically the front panel is almost identical, the main difference being the logo in the upper left of the SG-6 was removed.

Heath SG-8 RF Signal Generator:

Heathkit released a major update to their signal generator line in time for the 1954 holiday season. The SG-8 features a new style with a

The Heathkit SG-6 front panel controls along the bottom from left to right are:

(Panel nomenclature is shown in **bold**.)

MODULATION: **INT., EXT.**	2 pos. rotary sw.
AF IN - OUT: (no scaling)	Potentiometer
(band)**:** **A, B, C, D, E**	5 pos. rotary sw.
RF OUTPUT: **AC OFF** (ccw - no scaling)	Potentiometer.
RF STEPS: (Dot), (Dot), **HI**	3 pos. rotary sw.

Above the Modulation sw. (top to bottom):

AF: **OUT**	1/4" phone jack
AF: **IN**	1/4" phone jack

Above the band switch:

(main tuning): (the 6 frequency scales - Table 3)	Variable capacitor.

Above the RF Steps switch (top to bottom):

(No Nomenclature)	Jeweled pilot lamp
RF: **OUT**	1/4" phone jack

Table 4: SG-6 Controls

formed light grey cabinet and formed dark grey front panel, (both aluminum) with white nomenclature. Gone also are the 1/4" phone jacks; Instead Amphenol 75 series connectors are used. While the audio oscillator / modulator circuit remains the same as the SG-6 and SG-7, the RF oscillator has been updated replacing the 6C4 single triode with a 12AU7 dual triode and extending the fundamental frequency up to 110 Mc. (see Table 5). The tuning vernier was increased to 6:1. The additional triode stage acts as a cathode follower circuit to isolate the oscillator from the load and help frequency stability and ease of setting. With all these added features the price amazingly remained at $19.50!

Band	Lower:	Upper:
A	160 Kc	500 Kc
B	500 Kc	1650 Kc
C	1.65 Mc	6.5 Mc
D	6.5 Mc	25 Mc
E	25 Mc	110 Mc
E_2*	110 Mc	220 Mc

* Calibrated 2nd Harmonic of Band E

Table 5: SG-8 RF Ranges

All the generators covered thus far provide RF output at a level in excess of 100,000 µV and an audio output around 400 cps at a level of 2 to 3 volts. They all feature transformer operated power supplies. These units are designed for experimenters and radio-TV shops for troubleshooting and calibration. They all leak RF and the control over output and modulation levels is not very precise. These problems are addressed in higher priced laboratory grade RF signal generators such as the Heathkit LG-1.

Heath LG-1 Laboratory RF Signal Generator:
In 1953, at the same time as the SG-8 was introduced, Heathkit introduced its laboratory RF signal generator, the LG-1 with the same new paint scheme as the SG-8. This generator, while more limited in frequency range, offers calibrated output levels and modulation percentage measured on a front panel meter. Being more advanced the LG-1 commanded a higher price, $39.50; about twice the price of the other models discussed.

Heath LG-1 Features:
The LG-1 covers 100 Kc to 30 Mc in five bands. The RF output level can be controlled accurately by a calibrated step attenuator as well as a fine attenuation control, and the value read out on a front panel meter. The user can set the signal level accurately down to less than one microvolt. Extensive shielding virtually eliminates undesired RF leakage. RF output impedance is 50Ω and a terminated output cable with a built-in termination resistor is provided.

Modulation is either from an internal 400 cps Colpitts oscillator or an external audio signal. Modulation depth can be adjusted between 0% and 50% and read on the front panel meter. There is no external output for the internal 400 cps audio oscillator. The 100 Kc to 30 Mc output is divided into five ranges as shown in table 6

Band	Lower:	Upper:
A	100 Kc	290 Kc
B	280 Kc	1000 Kc
C	0.95 Mc	3.1 Mc
D	2.9 Mc	9.5 Mc
E	9.0 Mc	30 Mc

Table 6: LG-1 RF Ranges

Heath LG-1 Circuit Description:
Figure 4 shows the circuit of the four-tube LG-1. The transformer power supply provides about 160 volts DC that is divided down for the various circuits. The selenium rectifier power supply includes a filter choke to provide a higher degree of 60 cps ripple removal than found in the less expensive signal generators. An 0B2 gas voltage regulator tube produces a stable 105 VDC for the oscillator and buffer screen grid. Filament and pilot lamp voltage is provided by a separate winding on the transformer. There is a Standby position on the Function switch that allows filament voltage to be supplied without high voltage. An RF filter in the AC power leads prevents RF from entering or exiting the signal generator by the power cord.

The oscillator section is mounted within its own shielded compartment. The frequency determining coils and band switch are mounted in a separate shielded can within the shielded oscillator section. The RF oscillator consists of two tubes, a miniature 6AF4 tube wired as a Colpitts RF oscillator and an octal 6AV5 tetrode that buffers the oscillator and provides a low impedance 50Ω output through the Fine Attenuator control. A sample of the RF level is

measured at the output of this control for the meter circuit.

RF output from the buffer is connected by coaxial cable to a separately shielded five-position step attenuator and then to an Amphenol type 75 RF output connector. Each position of the step attenuator reduces the RF signal voltage by a factor of 10 (20 dB) while keeping the circuit impedance at 50Ω.

The modulator circuit consists of a dual triode 12AU7 tube. The first triode section is a 400 cps Colpitts oscillator similar to the one used in the SG-6 RF generator. The second section is a cathode follower that grid modulates the RF buffer stage. The Function switch allows the choice of no modulation, internal oscillator modulation or external modulation. A pair of banana jacks on the front panel provide input for an external modulation signal. External modulation bandwidth is 60 cps to 10 Kc.

LG-1 Specifications:

Frequency	100 kc - 30 mc in 5 calibrated bands.
Output	up to 100,000 microvolts.
Attenuation	10:1 ratio in 5 steps, 10:1 ratio continuous, metered.
Modulation	0-50% metered, 400 cps internal, or 60-10,000 cps external.
Termination	50 ohms.
Tubes	1-6AF4, 1-6AV5, 1-12AU7, 1-0B2.
Power	105-125 volts AC, 50-60 cps.
Dimensions	13" wide, 8" high, 7" deep.

Table 7: LG-1 Specifications

The meter circuit has a two-position Meter rotary switch to select either Modulation or RF Carrier; the meter itself has a sensitive 50μA movement. In the Modulation position a half bridge circuit consisting of two crystal diodes rectifies a sample of the AF voltage presented to the buffer. This voltage is read on the meter on a 0 - 50% marked scale. Note that in many tests a requirement for 30% modulation is standard; this can easily be set. When the meter switch is in the RF Carrier position a separate crystal diode rectifies a sample of the RF after the variable attenuator control, and this is read on the meter. Both meter circuits have a calibration potentiometer. The crystals diodes used are the Hughes HD-2257.

The row of front panel controls near the bottom from left to right are:

FUNCTION: 5 pos. rotary sw.
AC OFF, STANDBY, CW, MCW, EXT

METER: 2 pos. rotary sw.
MOD, RF CARRIER

RANGE: 5 pos. rotary sw.
A, B, C, D, E

FINE ATTENUATOR: Potentiometer.
(no scaling - read on meter)

STEP ATTENUATOR: 5 pos. rotary sw.
X1, X10, X100, X1K, X10K

Below and between the Function and Meter switches:

EXT. MOD.: Dual Banana Jacks

Below and between the Fine and Step attenuator controls:

RF OUTPUT: Amphenol 75 conn.

Above the Function switch (top to bottom):

(No Nomenclature) Jeweled pilot lamp

MODULATION: Potentiometer.
(unmarked scale)

Above the band switch:

(main tuning knob): Variable capacitor.
(the 5 frequency scales - Table 6)

Meter above the Step Attenuator switch:

CARRIER LEVEL (μV)
0 - 10 in 50 divisions

% MODULATION
0 - 50 in 25 divisions

Table 8: LG-1 Controls

All of these sections are further shielded by the outer cabinet. And the chassis and shields are copper plated to further improve shielding.

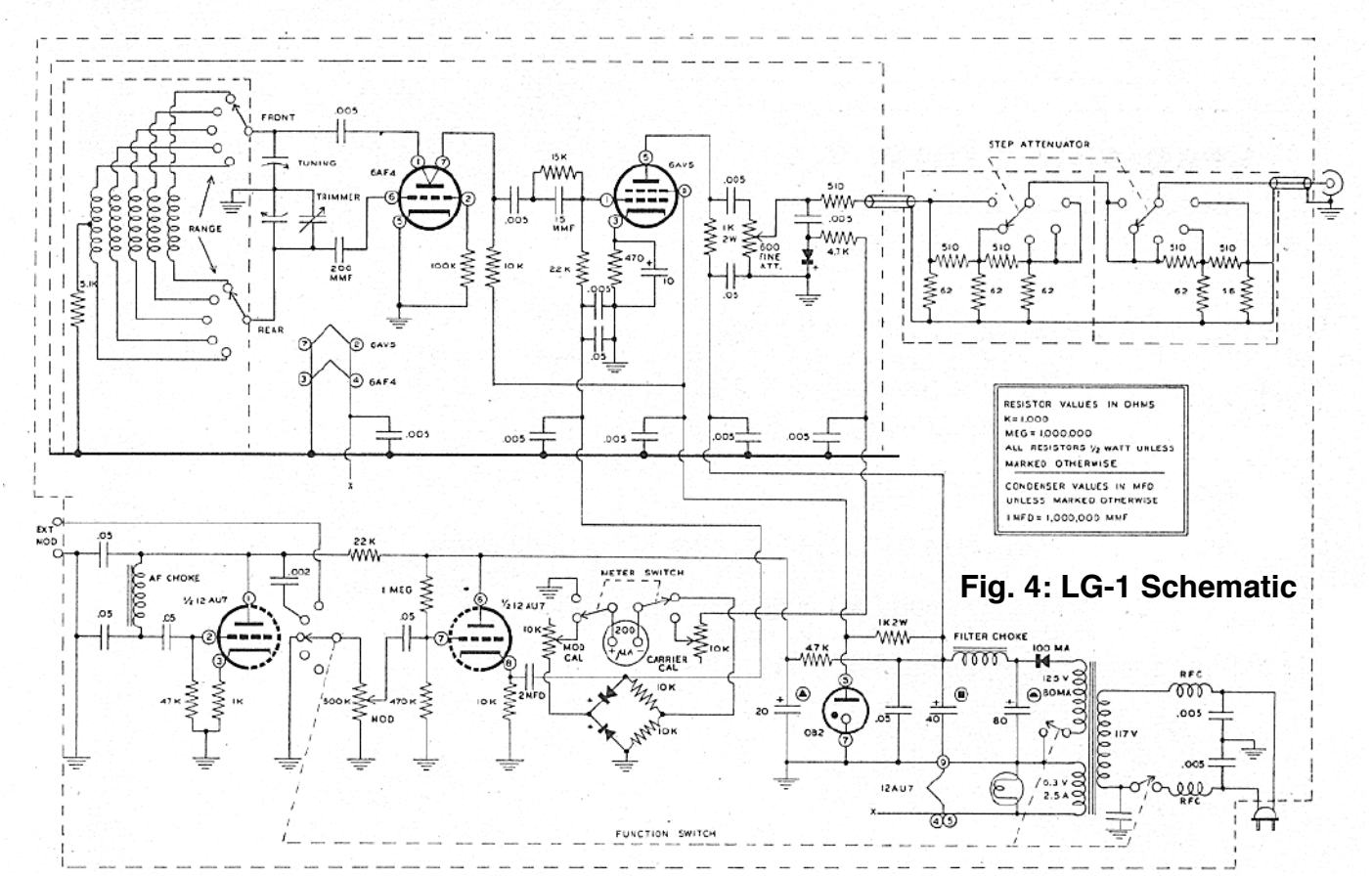


Fig. 4: LG-1 Schematic

Figure 5: AF6C's Restored Heathkit LG-1 on the club 10 Meter 28.375 net Frequency

Heath LG-1 Operation:
Operation of the LG-1 is quite simple. Set the Range switch to the range covering the desired test signal and the dial to the desired frequency. Next set the desired level: Assume, say, you want a level of 500 µV; set the Fine Attenuator until the meter reads 5.0; then turn the Step Attenuator to the X100 position.

Setting the modulation, is as simple. On the Function switch select CW if no modulation is needed, MCW if you'd like internal 400 modulation or EXT if you want modulation from an external source. External modulation requires a few volts of audio be applied to the front panel EXT. MOD. banana jacks. Finally, if modulation is selected adjust the Modulation control until the meter reads the desired modulation percent.

Figure 5 shows a recently restored Heathkit LP-1, previously owned by Ray Davis - W6NT, connected to an HP frequency counter and set on the club 10 meter net frequency of 28.375 Mc. Notice the RF output cable that ends in a small black plastic case holding a 50Ω terminating resistor and dual binding posts.

Cleaning and lubricating switches and potentiometers is a big part or restoration. Restoring the LP-1 was a challenge due mainly to the extensive shielding. To get access to certain components requires removing shields which in turn requires unsoldering components. It is important to take good notes or have the full manual. Many of the manuals that once frequented places on the web like BAMA (Boat Anchor Manual Archive) were only partial manuals and didn't cover the step-by-step assembly with its component and wiring layout. Most of these are gone now that a company is said to have bought the copyright to all the old Heathkit manuals and has worked successfully to remove copies of the free manuals that used to be available in many places on the Internet.

Another challenge restoring this kit involved the vernier dial. The lubricant had dried out and the vernier action was frozen causing the knob to operate the tuning capacitor directly. The vernier was removed and carefully cleaned. Unfreezing the vernier mechanism took a lot of patience and soakings in solvents and penetrating oils. Finally when it freed up, the mechanism was carefully re-lubricated using a Lubri-Plate like white lithium grease. It has since worked smoothly and flawlessly.

Final Comments:
Heathkit continued to build RF Generator kits. The RF-1 and later IG-102 are updated versions of the SG-8; the is IG-42, is a cosmetically updated version of the LP-1. These RF generators continued to be sold into the late seventies. Heathkit also make a low-end IG-5280 RF generator as part of their low-cost 5280 series test bench up to the time they began phasing out kits.

Finally I'd like to thank John - W6JOR who passed some old Heathkit manuals along, including the GC-1A Mohican communications receiver and OL-1 3" Oscilloscope. We'll be covering some of those kits in future articles.

Notes:
1. I've used the old frequency nomenclature of Mc and Kc and cps instead of MHz, KHz and Hz, since they were the nomenclature of the time period covered.

73, from AF6C

Remember if you come across any old Heathkit Manuals or Catalogs that you do not need, please pass them along to aid in my research.

Thanks - AF6C